The Macroinvertebrate Population of Missisquoi Bay and the Potential Impact on Nutrient Fluctuation

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Goals

- It has been demonstrated that macroinvertebrates can have a quantifiable impact on nutrient fluctuation in lake ecosystems.(Chaffin et al. 2010). We asked how the macroinvertebrate population may be affecting nutrient fluctuation in Lake Champlain's Missisquoi bay.
- We performed a survey of the macroinvertebrate population at four site in Missisquoi bay. We then reviewed the available literature to estimate what impact the most ubiquitous and varied macroinvertebrates in Missisquoi bay may be having.

Methods

- Samples were collected over the summer of 2012 at four sites in Missisquoi bay; the Rock River mouth, the main RACC sampling site, the point, and the Western bay. The Rock River mouth site was shallow and situated near the outflow of the river. The other three sites shared similar depths, although the point was characterized by is proximity to the main river outflow, and the Western bay site had noticeably fewer algae blooms.
- Samples were collected with a 6" diameter suction sampling tube or a petite ponar grab and stored in clean jars. The samples were taken at randomized depths, with duplicate samples collected at each location.
- Samples were processed with a 500 um sieve. The macroinvertebrates isolated were identified, counted, and preserved in ethanol.

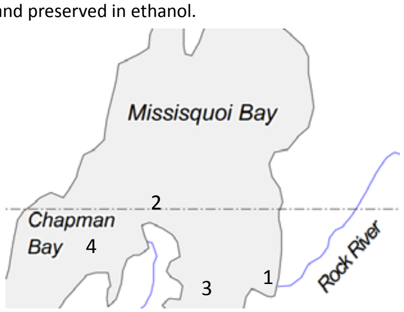

Figure 1. Map of Missisquoi bay. The rock river mouth (1), point (2), main site (3), and western bay (4) sampling sites are noted.

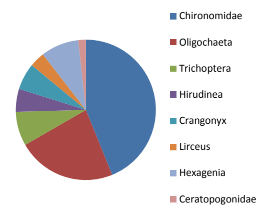

Figure 2. Macroinvertebrate Population at the Western Bay Sampling Site

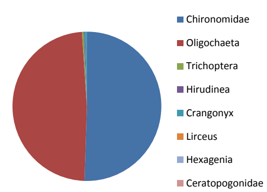

Figure 5. Macroinvertebrate Population at the Rock River Mouth Sampling Site

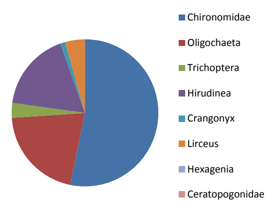

Figure 3. Macroinvertebrate Population at the Point Sampling Site

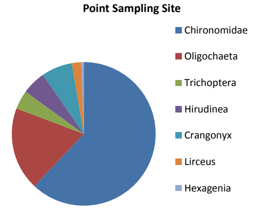

Figure 4. Macroinvertebrate Population at the Main Sampling Site

Results

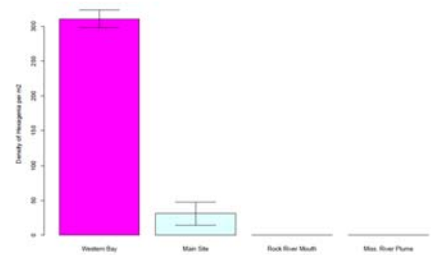

Figure 6. A comparison of Hexagenia densities at the four sampling site in Missisquoi bay. Error bars are standard error.

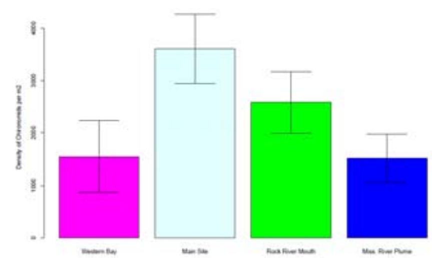

Figure 7. A comparison of chironomid densities at the four sampling site in Missisquoi bay. Error bars are standard error.

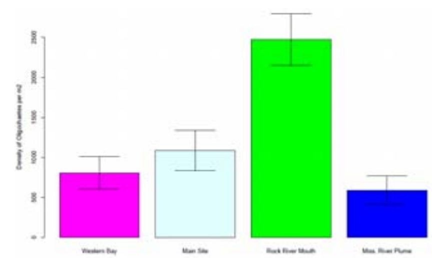

Figure 8. A comparison of oligochaete densities at the four sampling site in Missisquoi bay. Error bars are standard error.

Discussion

- Chironomids were found the be the most prevalent macroinvertebrate at all four sampling sites in Missisquoi bay. Chironomids have been demonstrated to cause an increase of suspended phosphorus in past studies (Gallepp 1979).
- Oligochaeta were the second most common macroinvertebrates found in Missisquoi bay.
- Hexagenia showed the largest variety in population size among the four sites. This variation in population could potentially be observed in a corresponding change in nutrient loading. Hexagenia (mayflies) are known be a source of internal phosphorus loading (Chaffin et al. 2010).
- Given the large number of phosphorus loading macroinvertebrates in Missisquoi bay, the macroinvertebrate population may be playing an overlooked role in the observed nutrient fluctuations and algae blooms.
- Further studies could quantify the phosphorus and other nutrient loads in Missisquoi bay. This data could then be crossed with the population data of chironomids, oligochaeta, and hexagenia to confirm the link between the macroinvertebrate population and the nutrient fluctuations of Missisquoi bay.

Work Cited

Chaffin, J. D., & Kane, D. D. (2010). Burrowing Mayfly (Ephemeroptera: Ephemeridae: Hexagenia spp.) Bioturbation and Bioirrigation: A Source of Internal Phosphorus Loading in Lake Erie. *Journal of Great Lakes Research, 36*(1), 57-63. doi: 10.1016/j.jglr.2009.09.003

Gallepp, G. W. (1979). Chironomid Influence on Phosphorus Release in Sediment-Water Microcosms. *Ecology, 60*(3), 547-556. doi: 10.2307/1936075

Acknowledgments

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